REMARKS

Claims 1-25, 40-44, and 50-56 are pending in the present Application. Claims 3-4, 12-14, 26-39, 45-49, and 54-55 have been canceled, Claims 1, 8, 9, 11, 15, 40, and 50 have been amended, Claim 57 has been added, leaving Claims 1-2, 5-11, 15-25, 40-44, 51-53, and 56-57 for consideration upon entry of the present Amendment.

Support for claim amendments and new Claim 57 can at least be found in the claims as originally filed.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Statement Concerning Common Ownership

Application serial number 09/965,630 and U.S. Published Patent Application No. 2001/0008722 (now U.S. Patent No. 6,682,843) were, at the time the invention of Application serial number 09/965,630 was made, both subject to an obligation of assignment to Proton Energy Systems, Inc.

Comments on Examiner's Response to Amendment

In response to the Examiner's concern that some parts of the Amendment submitted on July 12, 2004 were not legible, Applicants have attached those previously submitted amendments as an appendix to this present Amendment, and will mail the present Amendment as suggested by the Examiner in an attempt to correct this problem.

Response to Claim Suggestions

In Claim 9, the Examiner stated that the recitation "the polymer is an elastomeric threaded, woven, or stitched within the porous support" is awkward. After carefully reviewing the claim, the Examiner's suggestion is well taken. To improve the readability of Claim 9, Applicants have amended "elastomeric" back to "elastomer".

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 3 and 4 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, Claim 3 has been rewritten in independent form incorporating the subject matter of Claim 1, but not the subject matter of Claim 2, thereby creating a lack of antecedent basis in some claim elements in Claim 3.

This rejection is moot, as Claims 3 and 4 have been canceled without prejudice.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1-7, 9, 10, 12, 15, 18-20, and 50 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 6,030,718 to Fuglevand et al. Applicants respectfully traverse this rejection.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

With regards to independent Claims 1 and 50, Fuglevand et al. at least fail to teach an electrochemical cell comprising, *inter alia*, a flow field member comprising a porous support having a graded hydrophilicity, a combination of a graded hydrophobicity and graded porosity, or a combination of a graded hydrophilicity and graded porosity. Rather, Fuglevand et al. teach a proton exchange membrane fuel cell having a diffusion layer formed of successive layers, wherein each successive layer has a given hydrophobicity. (Col. 9, lines 54-57). They further teach that the diffusion layer has a hydrophobic gradient. (Col. 9, line 57).

Since Fuglevand et al. fail to teach a flow field member comprising a porous support having a graded hydrophilicity, a combination of a graded hydrophobicity and graded porosity, or a combination of a graded hydrophilicity and graded porosity, they fail to teach each and every element of Applicants' independent Claims 1 and 50. Accordingly, independent Claims 1 and 50 are not anticipated and allowable. Moreover, as dependent claims from an allowable independent claim, Claims 2, 5-7, 9, 10, and 18-20 are, by definition, also allowable.

With regards to Claim 15 (rewritten as an independent claim), Fuglevand et al. at least fail to teach an electrochemical cell comprising, *inter alia*, a porous flow field member comprising a first layer having a first hydrophobicity, and a second layer having a second,

different hydrophobicity, wherein the first layer has a first porosity and the second layer has a second, different porosity. Fuglevand et al. teach a diffusion layer comprising various layers having a given hydrophobicity, but are completely silent with regards to the porosity of each layer. Since Fuglevand et al. at least fail to teach a first layer having a first porosity and a second layer having a second, different porosity, they fail to teach each and every element of Applicants' independent Claim 15. Accordingly, independent Claim 15 is not anticipated and allowable.

Claim 54 stands rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Published Patent Application No. 2001/0036523 to Sobolewski. This rejection is moot, as Claim 54 has been canceled without prejudice.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 11 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,030,718 to Fuglevand et al. Applicants respectfully traverse this rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

As correctly noted by the Examiner, absent in Fuglevand et al. is any teaching of an electrochemical cell comprising, *inter alia*, a porous flow field member having a void volume of about 20 % to about 80 % based on a total volume of the porous flow field member.

However, in making the rejection, the Examiner stated that

> the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be sufficiently skilled to adjust the porosity of the flow field member of Fuglevand et al. to affect the gas diffusion properties of the electrode.

(O.A., page 4).

Applicants respectfully disagree with the Examiner that Fuglevand et al. would have suggest to one of skill in the art with a reasonable expectation of success at making a porous flow field member having a void volume of about 20 % to about 80 % based on a total volume of the porous flow field member. In the passage of Fuglevand et al. cited by the Examiner, Fuglevand et al. teach "applying a predetermined pattern of pressure of a given value to the diffusion layer 171, and which is effective to vary the porosity of the resulting diffusion layer 170." (O.A., pages 4-5 citing Col. 11, lines 14-18 of Fuglevand et al.). Absent is any teaching or suggestion of the given void volume for the diffusion layer. Accordingly, the Examiner has failed to make a *prima facie* case of obviousness. As such, Claim 11 is not obvious and allowable over Fuglevand et al.

Claim 55 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over WO 97/13287 to Mussell et al.

This rejection is moot, as Claim 55 has been canceled.

Claim 56 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over WO 97/13287 to Mussell et al. in view of U.S. Published Patent Application No. 2001/0008722 to Speranza et al. Applicants respectfully traverse this rejection.

For applications filed on or after November 29, 1999, this rejection may be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See 35 U.S.C. § 103 (c), MPEP 706.02(l)(1) and 706.02(l)(2). The instant disclosure was filed on September 27, 2001. Accordingly, this application is considered filed after November 29, 1999. As noted in the clear and conspicuous statement above, Application serial number 09/965,630 and U.S. Published Patent Application No. 2001/0008722 (now U.S. Patent No. 6,682,843) were, at the time the invention of Application serial number 09/965,630 was made, both subject to an obligation of assignment to Proton Energy Systems, Inc. Therefore, Speranza et al. is disqualified as prior art and cannot be used in a 35 U.S.C. § 103(a) obviousness rejection. Accordingly, the rejection under 35 U.S.C. § 103(a) should be withdrawn.

Claims 40 and 41 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 5,641,586 to Wilson. Claim 53 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 5,641,586 to Wilson in view of U.S. Published Patent Application No. 2001/0036523 to Sobolewski. Applicants respectfully traverse these rejections.

As correctly noted by the Examiner, Wilson at least does not teach a porous flow field member in fluid communication with the first flow field, wherein the porous flow field member comprises a sintered metal cloth. However, in making the rejection, the Examiner stated that

> [it] would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to sinter the metal cloth of Wilson '586. Such a sintering step would serve to increase the structural integrity of the cloth because the fibers would be fused together.

(O.A., page 7).

Wilson teaches the structure for their macroporous flow field is generally a resin bonded carbon paper. (Col. 5, lines 6-8). Wilson also teaches that "[o]ther possible porous structures include carbon or metal foams, sintered particles, and woven or non-woven metal screens." (Col. 5, lines 10-12). Absent in Wilson is any teaching of suggestion that would have motivated one of skill in the art to sinter the metal screen of Wilson. Rather, it appears that the Examiner is taking official notice that it would be obvious to sinter a metal screen by stating that the motivation to sinter the metal screen can be found in the "increased structural integrity of the cloth". Applicants respectfully request that the Examiner provide a citation in Wilson and/or another reference that would support the Examiner's position. For at least this reason, Wilson fails to teach or suggest each and every element of Applicants' independent Claim 40. As such, Applicants' independent Claim 40 is not obvious and is therefore allowable over Wilson. Moreover, as a dependent claim from an allowable independent claim, Claim 41 is, by definition, also allowable.

With regards to Claim 53, Applicants respectfully submit that Sobolewski fails to cure the deficiencies of Wilson. More particularly, Wilson, either alone or in combination with Sobolewski, fail to teach or suggest a porous flow field member in fluid communication with the first flow field, wherein the porous flow field member comprises a sintered metal cloth. For at least this reason, independent Claim 40 is not obvious and allowable. As a dependent claim from an allowable independent claim, Claim 53 is also allowable.

Claims 8, 13, 14, 16, 17, and 21 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,030,718 to Fuglevand et al. in view of U.S. Patent 5,641,586 to Wilson. Applicants respectfully traverse this rejection.

With regards to Claim 8 (rewritten as an independent claim), Applicants respectfully submit that Fuglevand et al., either alone or in combination with Wilson, fail to teach or suggest the electrically conductive materials claimed by Applicants.

In making the rejection the Examiner stated that "an artisan would be motivated to use nickel or steel in the member of Wilson '586. As would be appreciated by the artisan, these materials have characteristics such as high strength and high oxidation resistance." (O.A., page 9). Since neither nickel nor steel are mentioned in Wilson and Fuglevand et al., it appears that the Examiner is taking official notice that it would be obvious to use these materials. Applicants respectfully request that the Examiner supply a secondary reference indicating that these materials are taught or suggested as in the manner claimed by Applicants.

Without the motivation to modify at least Wilson, the above cited references at least fail to teach a porous flow field member comprising a porous support integrated with a polymer or a combination of a polymer and an electrically conductive material, wherein the electrically conductive material is selected from the group consisting of niobium, zirconium, tantalum, titanium, steel, nickel, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials. For at least this reason, the above-cited references fail to teach or suggest each and every element of Applicants' independent Claim 8. Accordingly, Applicants' independent Claim 8 is not obvious and allowable.

With regards to Claims 16 and 17, Wilson fails to cure the deficiencies of Fuglevand et al. with regards to independent Claim 15. More particularly, the references, alone or in combination, fail to teach or suggest an electrochemical cell comprising, *inter alia*, a porous flow field member comprising a first layer having a first hydrophobicity, and a second layer having a second, different hydrophobicity, wherein the first layer has a first porosity and the second layer has a second, different porosity. For at least this reason, independent Claim 15 is not obvious and allowable. Moreover, as a dependent claim from an allowable independent claim, Claims 16 and 17 are, by definition, also allowable.

Similarly, Claim 21 is allowable as being a dependent claim from allowable independent Claim 1. More particularly, the above-cited references fail to teach or suggest an electrochemical cell comprising, *inter alia,* a flow field member comprising a porous support having a graded hydrophilicity, a combination of a graded hydrophobicity and graded porosity, or a combination of a graded hydrophilicity and graded porosity. For at least this reason, independent Claim 1 is not obvious and allowable. As such, Claim 21 is also allowable.

Claim 52 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,030,718 to Fuglevand et al. in view of U.S. Published Patent Application No. 2001/0036523 to Sobolewski. Applicants respectfully traverse this rejection.

The Examiner relied upon Sobolewski for teaching a porous support comprising carbon nanotubes. However, Sobolewski fails to cure the deficiencies of Fuglevand et al. More particularly, the references, either alone or in combination, fail to teach or suggest an electrochemical cell comprising, *inter alia*, a flow field member comprising a porous support having a graded hydrophilicity, a combination of a graded hydrophobicity and graded porosity, or a combination of a graded hydrophilicity and graded porosity. For at least this reason, independent Claim 1 is not obvious and allowable. Moreover, as a dependent claim from an allowable independent claim, Claim 52 is allowable.

Claims 40-44 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over WO 97/13287 to Mussell et al. in view of U.S. Patent 5,641,586 to Wilson. Applicants respectfully traverse this rejection.

The Examiner relied upon Wilson primarily for teaching a sintered metal cloth. Applicants respectfully direct the Examiner's attention to the above discussion relating to this reference. In other words, even if combined, the above-cited references would at least fail to teach or suggest a porous flow field member in fluid communication with the first flow field, wherein the porous flow field member comprises a sintered metal cloth. For at least this reason, independent claim 40 is not obvious and allowable. Moreover, as a dependent claim from an allowable independent claim, Claims 41-44, are, by definition, also allowable.

Claims 22-25 and 51 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,030,718 to Fuglevand et al. in view of WO 97/13287 to Mussell et al. Applicants respectfully traverse this rejection.

In making the rejection, the Examiner relied upon Mussell et al. primarily for teaching "a flow field member having layers having different porosity". (O.A., page 12). However, Mussell et al. fail to cure the deficiencies of Fuglevand et al. More particularly, these references at least fail to teach or suggest an electrochemical cell comprising, *inter alia*, a flow field member comprising a porous support having a graded hydrophilicity, a combination of a graded hydrophobicity and graded porosity, or a combination of a graded hydrophilicity and graded porosity. Accordingly, independent Claims 1 and 50 are not obvious and allowable. Moreover, as dependent claims from an allowable independent claim, Claims 22-25 and 51, are, by definition, also allowable.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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Appendix

Please note this appendix is provided in an attempt to address the Examiner's concern about the visibility of some of the amendments presented in the amendment dated July 12, 2004. These amendments appear exactly as presented in the above referenced Amendment, including claim identifiers as presented in that Amendment.

****THE FOLLOWING AMENDMENTS WERE MADE IN AMENDMENT DATED JULY 12, 2004****

IN THE SPECIFICATION

Please amend the paragraph beginning at line 9 on page 1 and ending at line 6 on page 2 as follows.

Electrochemical cells are energy conversion devices, usually classified as either electrolysis cells or fuel cells. A proton exchange membrane electrolysis cell can function as a hydrogen generator by electrolytically decomposing water to produce hydrogen and oxygen gas, and can function as a fuel cell by electrochemically reacting hydrogen with oxygen to generate electricity. Referring to Figure 1, which is a partial section of a typical anode feed electrolysis cell 100 ("cell 100"), process water 102~~114~~ is fed into cell 100 on the side of an oxygen electrode (anode) 106~~104~~ to form oxygen gas 104~~116~~, electrons, and hydrogen ions (protons) 106~~118~~. The reaction is facilitated by the positive terminal of a power source 120 electrically connected to anode 116~~104~~ and the negative terminal of power source 120 connected to a hydrogen electrode (cathode) 114~~106~~. The oxygen gas 104~~116~~ and a first portion 108 of the process water exit cell 100, while protons 106~~118~~ and a second portion 110 of process water migrate across a proton exchange membrane 118~~102~~ to cathode 114~~106~~ where hydrogen gas 112 is formed.

Please amend the paragraph on page 6, lines 3-12 as follows.

In another embodiment, in an electrochemical cell comprising a first electrode; a second electrode; a membrane disposed between and in intimate contact with the first electrode and the second electrode; a first flow field in fluid communication with the first electrode opposite the membrane; a second flow field in fluid communication with the second electrode opposite the

membrane, a method for managing fluid flow comprises introducing a quantity of fluid into the first flow field; passing the fluid through ~~a and~~ a graded, porous flow field member in fluid communication with the first flow field opposite the first electrode, wherein the flow field member comprises a porous support modified to provide a selected porosity, a selected hydrophobicity, or a combination thereof; and contacting the fluid with the first electrode.

Please amend the paragraph beginning on page 16, line 11 and ending on page 17, line 10 as follows.

The polymeric material~~maaterial~~ may itself be made conductive, typically by the incorporation of electrically conductive particulate materials as is known in the art. Suitable electrically conductive particulate materials include but are not limited to the above-mentioned electrically conductive metals and alloys and superalloys thereof, preferably copper and nickel. Also useful are non-conductive particles coated with conductive materials, for example silver-coated glass spheres, as well as conductive, particulate carbon, for example acetylene blacks, conductive furnace black, super-conductive furnace black, extra-conductive furnace black, vapor grown carbon fibers, carbon nanotubes, and the like. Copper, nickel, conductive carbon, or a combination thereof is presently preferred because of their conductivity, availability, low cost, and compatibility with the electrochemical cell environment. The particular shape of the particles is not critical, and includes spheres, plates, whiskers, tubes, drawn wires, flakes, short fibers, irregularly-shaped particles, and the like. Suitable particle sizes and amounts vary widely, and are readily determined by one of ordinary skill in the art depending on factors including but not limited to the particular materials chosen, the desired elastomeric characteristics and conductivity of the pressure pad, the cost of the materials, the size of the pressure pad, the method of manufacture, and other considerations. Regardless of the exact size, shape, and composition of the conductive fillers particles, they should be thoroughly dispersed through the polymeric resin. Such compositions and their method of manufacture have been described, for example, in U.S. Patent Nos. 4,011,360; 5,082,596; 5,296,570; 5,498,644; 5,585,038; and 5,656,690.

IN THE CLAIMS

1. (Currently Amended) An electrochemical cell system, comprising:

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of ~~opposite~~ the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of ~~opposite~~ the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, ~~opposite the first electrode,~~ wherein the flow field member comprises a porous support having ~~modified to provide~~ a graded ~~selected~~ hydrophobicity, a ~~selected~~ graded hydrophilicity, a combination of a ~~selected~~ graded hydrophobicity and ~~selected~~ graded porosity, or a combination of a ~~selected~~ graded hydrophilicity and ~~selected~~ graded porosity.

2. (Original) The electrochemical cell system of claim 1, wherein the porous flow field member comprises a porous support integrated with a polymer or a combination of a polymer and an electrically conductive material.

3. (Currently Amended) An electrochemical cell system, comprising:

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, wherein the flow field member comprises a porous support having a selected hydrophobicity, a selected hydrophilicity, a combination of a selected hydrophobicity and selected porosity, or a combination of a selected hydrophilicity and selected porosity, and ~~The electrochemical cell system of claim 2,~~ wherein the porous flow field member comprises about 5 wt. % to about 95 wt. % based on the total weight of the mixture of porous support material and about 5 wt. % to about 95 wt. % based on the total weight of the mixture of polymer.

4. (Original) The electrochemical cell system of claim 3, further comprising about 50 wt. % to about 80 wt. % based on the total weight of the mixture of porous support material and about 20 wt. % to about 50 wt. % based on the total weight of the mixture of polymer.

5. (Original) The electrochemical cell system of claim 2, wherein the polymer is selected from the group consisting of a hydrophobic polymer, a hydrophilic polymer, and a hydrophilic/hydrophobic polymer mixture.

6. (Original) The electrochemical cell system of claim 5, wherein the hydrophobic polymer is selected from the group consisting of polytetrafluoroethylene, fluorinated ethylene propylene, polyvinylidinefluoride, ethylene chlorotrifluoroethylene copolymer, ethylene tetrafluoroethylene, perfluoroalkoxy, tetrafluoroethylene perfluoromethylvinylether copolymer, and mixtures comprising at least one of the foregoing hydrophobic polymers.

7. (Original) The electrochemical cell system of claim 5, wherein the hydrophilic polymer is selected from the group consisting of proton conductive ionomers and ion exchange resins.

8. (Original) The electrochemical cell system of claim 2, wherein the electrically conductive material is selected from the group consisting of niobium, zirconium, tantalum, titanium, steel, nickel, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials.

9. (Currently Amended) The electrochemical cell system of claim 2, wherein the polymer is an ~~elastomer~~ elastomeric threaded, woven, or stitched within the porous support.

10. (Original) The electrochemical cell system of claim 9, wherein the porous support is a carbon cloth.

11. (Original) The electrochemical cell system of claim 1, wherein the porous flow field member has a void volume of about 20 % to about 80 % based on the total volume of the flow field member.

12. (Currently Amended) An electrochemical cell system, comprising:

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, wherein the flow field member comprises a porous support having a selected hydrophobicity, a selected hydrophilicity, a combination of a selected hydrophobicity and selected porosity, or a combination of a selected hydrophilicity and selected porosity, ~~The electrochemical cell system of claim 2,~~ wherein the porous flow field member comprises a first layer comprising a first layer having a first hydrophobicity, and a second layer having a second, different hydrophobicity.

13. (Original) The electrochemical cell system of claim 12, wherein the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a screen.

14. (Original) The electrochemical cell system of claim 13, wherein the elastomeric material is selected from the group consisting of silicones, fluoroelastomers, and combinations comprising at least one of the foregoing elastomeric materials.

15. (Original) The electrochemical cell system of claim 12, wherein the first layer has a first porosity and the second layer has a second porosity.

16. (Currently Amended) The electrochemical cell system of claim 15, wherein ~~wherein~~ the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a screen.

17. (Original) The electrochemical cell system of claim 15, wherein the first layer comprises a porous support integrated with an elastomeric material, and the second layer comprises a sintered metal cloth.

18. (Original) The electrochemical cell system of claim 1, wherein the porous flow field member further comprises a catalyst.

19. (Original) The electrochemical cell system of claim 18, wherein the catalyst is selected from the group consisting of platinum, palladium, rhodium, carbon, gold, tantalum, tungsten, ruthenium, iridium, osmium, alloys comprising at least on the foregoing materials, and mixtures comprising at least one of the foregoing catalysts.

20. (Original) The electrochemical cell system of claim 1, wherein the porous support comprises a material that is non-oxidizable at anodic potentials of less than about 4 volts.

21. (Currently Amended) The electrochemical cell system of claim 1, wherein the porous support is a screen, a perforated sheet, a pierced sheet, a sintered metal cloth, ~~,~~ an etched sheet, a felt, or a woven mesh comprising a material selected from the group consisting of niobium, zirconium, tantalum, titanium, nickel, cobalt, steel, and alloys comprising at least one of the foregoing materials.

22. (Currently Amended) The electrochemical cell system of claim 1, further comprising a second porous support contacting the first porous support and having a greater void volume than the first porous support, and a third porous support contacting the second porous support on ~~the~~ a side of the second porous support opposite the first porous support, and having a greater void volume than the ~~seconed~~ second porous support.

23. (Currently Amended) The electrochemical cell system of claim 22, wherein each of the porous supports is integrated with an ~~elactomeric~~ elastomeric material.

24. (Original) The electrochemical cell system of claim 23, wherein the elastomeric material further comprises an electrically conductive material.

25. (Original) The electrochemical cell system of claim 23, wherein the electrically conductive material is selected from the group consisting of copper, silver, silver-coated spheres, niobium, zirconium, tantalum, titanium, steel, nickel, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials.

26-39. (Cancelled)

40. (Currently Amended) An electrochemical cell system, comprising

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of ~~opposite~~ the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of ~~opposite~~ the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field ~~opposite the first electrode~~, wherein the flow field member comprises a sintered metal cloth.

41. (Original) The electrochemical cell system of claim 40, wherein the sintered metal cloth is integrated with a polymer and optionally a catalyst, or a combination of a polymer, an electrically conductive material, and optionally a catalyst, wherein the polymer is selected from the group consisting of a hydrophobic polymer, a hydrophilic polymer, and a hydrophobic/hydrophilic polymer mixture.

42. (Original) The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a graded porosity.

43. (Original) The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a first layer having a first porosity and a second layer having a second, different porosity.

44. (Original) The electrochemical cell system of claim 40, wherein the sintered metal cloth comprises a first layer having a first void volume, a second layer having a second, different void volume, and a third layer having a third, different void volume, wherein the first void volume is greater than the second void volume, and the second void volume is greater than the third void volume.

45-49. (Cancelled)

50. (Currently Amended) In an electrochemical cell comprising a first electrode; a second electrode; a membrane disposed between and in intimate contact with the first electrode and the second electrode; a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of ~~opposite~~ the membrane; a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of ~~opposite~~ the membrane opposite the first side, a method for managing fluid flow comprises

introducing a quantity of fluid into the first flow field;

passing the fluid through a graded, porous flow field member in fluid communication with the first flow field ~~opposite the first electrode~~, wherein the flow field member comprises a porous support having ~~modified to provide~~ a ~~selected~~ graded hydrophilicity, a graded ~~selected~~ hydrophobicity, a combination of a graded~~selected~~ hydrophilicity and a graded~~selected~~ porosity, or-, a combination of a graded~~selected~~ hydrophobicity and a graded~~selected~~ porosity; and

contacting the fluid with the first electrode.

51. (Original) The electrochemical cell of claim 50, wherein the porous flow field member comprises a first porous support having a first void volume, a second porous support having a second, different void volume, and a third porous support having a third, different void volume, wherein the first void volume is greater than the second void volume, and the second void volume is greater than the third void volume.

52. (New) The electrochemical cell system of claim 2, wherein the electrically conductive material comprises carbon nanotubes.

53. (New) The electrochemical cell system of claim 41, wherein the electrically conductive material comprises carbon nanotubes.

54. (New) An electrochemical cell system, comprising:

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, wherein the porous flow field member comprises a porous support integrated with an electrically conductive material, wherein the electrically conductive material comprises carbon nanotubes.

55. (New) An electrochemical cell system, comprising:

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, wherein the flow field member comprises a first porous support having a selected hydrophobicity, a selected hydrophilicity, a combination of a selected hydrophobicity and selected porosity, or a combination of a selected hydrophilicity and selected porosity; a second porous support contacting the first porous support and having a greater void volume than the first porous support, and a third porous support contacting the second porous support on a side of the second porous support opposite the first porous support, and having a greater void volume than the second porous support, wherein each of the first, second, and third porous support is integrated with an elastomeric material.

56. (New) An electrochemical cell system, comprising

a first electrode;

a second electrode;

a membrane disposed between and in intimate contact with the first electrode and the second electrode;

a first flow field in fluid communication with the first electrode, wherein the first electrode is disposed on a first side of the membrane;

a second flow field in fluid communication with the second electrode, wherein the second electrode is disposed on a second side of the membrane opposite the first side; and

a porous flow field member in fluid communication with the first flow field, wherein the porous flow field member has a gradient of porosity, and further wherein the porous flow field member

comprises a porous support integrated with an electrically conductive material, wherein the electrically conductive material is selected from the group consisting of niobium, zirconium, tantalum, titanium, cobalt, mixtures comprising at least one of the foregoing materials, and alloys comprising at least one of the foregoing materials.